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ABSTRACT

Presented in the principal article, "Planning, Starting, and Operating an Educational Incentives Project," is a summary of activities to date in an educational savings project in Taiwan. The incentive project is designed to reward those couples who limit their family size, by providing funds for their children's secondary and higher education. To pretest the nationwide program, a pilot program was implemented in September, 1971, one of the first such plans to have been adapted to local conditions. Design of the pilot project, its procedures (preliminary survey, promotion, enrollment, eligibility, and financing), evaluation, and the nationwide scheme are described. Although it will be several years before the effect of this program on fertility is known, it is felt a review of the initial stages may be of value to those who wish to implement similar projects. Also included in the paper are two further reports: "Singapore: A Cost-Effect Analysis of a Family Planning Program" and "IUDs and the Birth Rate in Greenland." The first reports statistically an analysis of cost by method and demonstrates one way cost data can be used in measuring cost-effectiveness. The second describes the results of an IUD program in Narssaq District, South Greenland. (BL)

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Studies in Family Planning

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Planning, Starting, and Operating an Educational Incentives Project

by OLIVER D. FINNIGAN, III, *and* T. H. SUN

This article presents a summary of activities to date in an educational savings project in Taiwan. The authors, Mr. Finnigan, field associate of the Population Council in Taiwan, and Dr. Sun, executive secretary of the Committee on Family Planning of the Taiwan Provincial Health Department planned the project.

In recent years numerous incentive proposals have been advanced as a means of encouraging small families. The project in Taiwan is one of the first such plans to have been adapted to local conditions and implemented. Although it will be several years before the effect of this program on fertility is known, a review of the initial stages will be of value to those who wish to implement similar projects.

The educational savings project in Taiwan is designed to reward those couples who limit their family size, by providing funds to enable them to send their children to secondary schools and universities. After a study of local conditions and a review of literature concerning incentives, we developed the project to be applied nationwide. We implemented a pilot program in a township in Taiwan in September 1971 to pretest the nationwide program. This pilot program may help to determine the next step in Taiwan's efforts to lower its birth rates and thereby bring them more into line with greatly lowered death rates.

BACKGROUND

By 1971, the crude death rate in Taiwan had fallen to about 5 per thousand per year, and the crude birth rate had declined from a 1952 peak of 50 to about 27 per thousand. Although government contraceptive services have reached almost half of all married couples in Taiwan, and recruitment of new family planning acceptors has continued to increase each year, program planners have been concerned that the birth rate in Taiwan will soon cease to fall, and may even rise (*1*). This concern is caused primarily by the large numbers of young people entering the reproductive years, and by the lack of a significant drop in the number of children wanted by each couple (*2, 3*). When the third knowledge, attitudes, and practice (KAP) survey was completed in Taiwan in early 1970, it became evident that little or no change had taken place in the stated ideal number of children, which remained at about four (*4*).

Our objective was to develop a practical program designed to motivate couples to have smaller families than they had previously planned or expected. First we had to discover why Taiwanese families wish to have many children. In Taiwan, as in other societies lacking established social security systems, it is important to have many children in order to provide for old-age support. In some countries where the death rate is high, the number of children that each woman must bear is further inflated by the necessity of compensating for high mortality. In Taiwan, however, excellent medical care and public health services have reduced the death rate and have also established an effective, island-wide contraceptive delivery system. Couples in Taiwan are confident that

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their children will live, and they have consequently achieved their expected fertility with relative ease. As of 1970 the average woman wanted 3.9 children, and total fertility averaged 4.0. Fully 45 percent of married women aged 20–44 were practicing contraception. Present-day Chinese couples then, have not been motivated to have many children because of high death rates among children or because of lack of knowledge or availability of contraception.

A 1969 survey of men found that fully 62 percent expected to live with their children in their old age, and 57 percent expected their children to give them money from time to time regardless of the child's economic condition (*5*). These findings are consistent with traditional Chinese values. They point to the extended-family pattern with attendant expectations for old-age support as the rationale for wanting and having large families. A daughter leaves the extended family to join the son-in-law's clan and this contributes to the strong bias toward bearing sons. On the average, couples want to have 2.3 sons and 1.6 daughters, a total of 3.9 children.

These considerations lead to the question of how Chinese couples expect their children to succeed financially. Surveys indicate that parents perceive the path to financial success to be through education. Traditionally, Chinese families have placed strong emphasis on higher education and commercial and professional employment. Although only 16 percent of men have attended high school or college, 67 percent expect one or more of their children to finish college. And although only 29 percent have any idea of the cost of a college education, 76 percent say that this will be a "heavy financial burden." When asked whether saving money is important, 78 percent say that it is, and, among these, 40 percent spontaneously cite costs of education as the most important reason for saving.

THE PROGRAM

Our program takes these conditions into account. It capitalizes on the strong desire to save by establishing for the couples who limit family size a formal bank account earmarked for education. There is no financial obligation on the part of the couple; the program deposits money for them. The account, which will cover high school and college tuition and related fees, will provide schooling for two children from junior high through senior high school at present costs. Promotional materials stress that if achieving old-age security depends on having successful children, then a child's success in this modern world depends on his or her education. The program promises to guarantee money for education as long as the family remains small.

A review of the extensive literature concerning incentive schemes and proposals going beyond family planning helped the authors to develop this plan into a practical program to be applied nationwide (*6–11*). The pilot project described here is intended to pretest the nationwide program.

Using Bernard Berelson's criteria of feasibility (*9*) we determined that the pilot project was medically and scientifically sound, politically viable, administratively simple, morally acceptable, and financially possible. The effectiveness is yet to be proven; however, the plan is designed so that no funds are lost if it fails since final payments are tied to fertility reduction. The feasibility of a nationwide program will be determined by the progress of our pilot project. It is not the intent of this paper to make extensive forecasts concerning the final effects of this program. The authors merely hope to show others how the program was designed and implemented in order that readers who wish to attempt similar projects may profit by Taiwan's experience.

THE PILOT PROJECT

Design

We selected a representative rural township in an urban fringe area (Hua township, Changua county) for implementation of the pilot project. (Family planning services are available at the township health station and in the nearby small city of Changhua.) We drafted a pilot project, which received extensive comment from the Population Studies Center of the University of Michigan and the Population Council in New York. It was also critically reviewed by local personnel including the county mayor, and household registration, health, and banking officials in the selected area. The final plans for implementation and operation of the project were worked out in consultation among township, county, and provincial personnel, and a summary was forwarded to national and provincial leaders for their information.

In its final form the pilot project offers to couples with zero, one or two children an annual deposit in a savings account for each year that they do not exceed two living children. These deposits are recorded on an account card kept by each enrolled woman. If a couple has a third child the value of the savings account is immediately reduced by 50 percent. If they have a fourth child it is cancelled and all funds are returned to the bank.

TABLE 1. *Deposit and Withdrawal Schedules at 9.5 Percent Interest Compounded Annually (U.S. Dollars)*

A. Regular plan

	Annual deposits	
Year	0–2 Children	3 Children
0	$ 25.00	$12.50
1	5.00	2.50
2	5.00	2.50
3	10.00	5.00
4	10.00	5.00
5	15.00	7.50
6	15.00	7.50
7	20.00	10.00
8	20.00	10.00
9	25.00	12.50
10	25.00	12.50
Total	$175.00	$87.50
	Value of account at withdrawal	
Year	0–2 Children	3 Children
10	$267.50	$133.75
11	292.96	146.48
12	320.80	160.40
13	351.24	175.62
14	384.60	192.30

B. Special plan

	Annual deposits
Year	3 Children
0	$35.00
1	7.50
2	7.50
3	10.00
4	10.00
5	12.50
Total	$82.50
	Value of account at withdrawal
Year	3 Children
6	$133.75
7	146.48
8	160.40
9	175.62
10	192.30

2

The account is held at the maximum permissible long-term interest rate (now 9.5 percent), and all accumulated interest is added to the account. The enrollment deposit is large enough to be attractive to most couples and annual deposits increase as the program progresses. The account can be closed by a one-time withdrawal from 10 to 14 full years after enrollment. At this time a book of cashier's checks will be issued payable for educational expenses in public high schools and colleges and equal to the total amount of deposits plus interest. After ten full years the account will be worth US$267.50. If the couple waits for four additional years, the account increases in value by $117.10, to $384.60. The schedule of deposits and the value of the account at withdrawal are presented in Table 1.

For the first year of operation of the program a special plan is being offered to couples who already have three children. Under this plan deposits are increased, and the savings account matures from six to ten years after deposits begin, payable at the reduced rate used for all other three-child families. This plan aims at attracting quickly those couples who are likely to have a fourth child in the near future.

To receive the annual deposit, one member of a couple reports to a special desk in the township office during the anniversary month of enrollment. Upon presentation of an identification card she (or he) is asked to sign a statement listing her living children by name, and attesting that she has no other living children. This statement is checked against the family's household registration document, which is kept in the same office. If these documents agree, the account card is immediately updated to show an additional deposit. In Taiwan these two checks are thought to be sufficient to deter extensive fraud.

Procedure

Preliminary Survey

The first step in our program was to conduct a thorough baseline survey of eligible women in Hua Tan. This township has a population of about 35,000, with 1,477 registered married women less than 30 years old with three or fewer children. These women made up the pool of eligibles. Only 1,103 of these women were still living in Hua Tan at the time of the survey. Out of these, 1,051 were interviewed, but 90 either failed to complete the interview, or were found to be pregnant for the fourth time. Thus, the final population of women to be followed in this study is 961. This survey confirmed prior island-wide results reported earlier. The mean desired number of children was 3.5, with a decided preference for sons. Although only 26 percent of husbands and 9 percent of wives had attended junior high school or above, almost 75 percent expected sons and over 50 percent expected daughters to finish college. Sixty-five percent expected to live with their children for the rest of their lives and 64 percent felt that their children should give them money regardless of the child's economic condition. Although 95 percent felt that it was necessary to save money and over half of these felt that the primary purpose of saving was for education, only 9 percent had saved regularly in recent years and 64 percent had never saved anything. (See Table 2 and Figure 1.)

Promotion

Three weeks before the start of recruitment there was a meeting of all 18 elected village leaders and the 18 appointed village administrators in the township. This meeting was presided over by the county mayor and was designed to win the support of these locally elected officials. The county and township mayors described the demographic potential and the family planning aspects of this plan. The executive secretary of the Provincial

FIGURE 1. *Ranking of Five Principal Objectives for Saving, Cumulative, Excluding Nonresponse and "Other"*

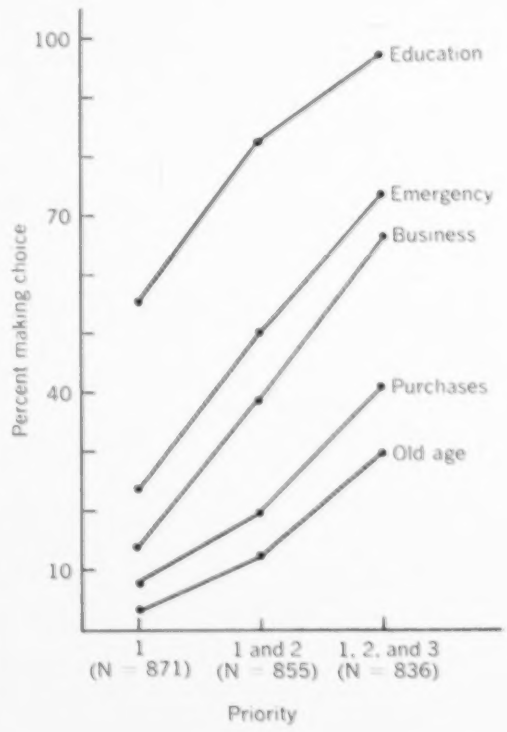

TABLE 2. *Summary of Preliminary Survey Findings, Hua Tan Township, Among Married Women under Age 30 with Three or Fewer Children (N = 961)*
(figures in percents)

A. Completed education

	Actual		Expected for children	
	Wife	Husband	Son(s)	Daughter(s)
Primary or below	91	74	6	16
Junior or senior high	8	23	23	30
College or other	1	3	71	54
	100	100	100	100

B. Savings

Beliefs about		Practice in recent years	
Very necessary to save	79	Save regularly	9
Necessary to save	16	Save occasionally	27
Not necessary to save	5	Never save	64
	100		100

C. Expectations of children

Expect to live with them		Expect money from them	
For rest of life	65	In all cases	64
When old	4	If live together	2
Depends on situation	23	Depends on situation	21
No	8	No	13
	100		100

Family Planning Committee and the secretary of the Planned Parenthood Association of China outlined the mechanics of the plan. The international implications of this experiment were briefly reviewed by Population Council staff. An hour of questions and answers followed the formal portion of the gathering; the local response was quite favorable.

The village leaders' meeting was followed by separate village gatherings of eligible women, convened and chaired by village leaders. At these gatherings, provincial and county staff explained the program and answered questions.

Before these meetings each eligible woman was sent a brief description of the savings plan and an invitation to attend her village meeting. These mailings included a flyer that stressed the following: (1) old-age security is best assured if children are successful; (2) well-educated children are most likely to succeed; and (3) this plan can help pay for education, which can lead to financial success for children and to old-age support for parents. The local title of the program is "Free Educational Savings Plan for Small Families."

In mailings and meetings, couples were advised that they had nothing to lose since they made no input into the account and could withdraw from the project at any time. They were told that enrollment would be limited and that it would continue for one month on a first-come-first-served basis. At local meetings a representative from the local health station spoke briefly and answered questions on contraception.

Enrollment

Enrollment took place in September in two rounds. In the first round, two three-man teams held full-day enrollment sessions in each village. In two villages over 90 percent of eligible women enrolled at these sessions; in all, 615 women signed up in this first round. At the meeting of village administrators held on 24 September, awards of US$2.50 were given to the administrators of the four best villages, and the top two were asked to share their methods. One leader had first convinced the village gossips and grandmothers who then did the recruiting for him. Another administrator had visited individual homes to explain the program.

A simple incentive system was announced for the last week of recruitment, which was held at the township office. Under this plan village administrators received from US$0.02 to $0.15 for every additional case recruited, depending on the final percentage enrolled. By 30 September, 698 women had enrolled for a total of 65 percent of all women confirmed to be eligible. Appeals and special cases brought the final total to 727, or 69 percent. The only opposition to the program came from several older persons who warned women that if they joined now and quit later they would be punished. Village administrators agree that such rumors had little impact on enrollment.

Eligibility

In planning and implementing this pilot program we had certain problems in establishing eligibility. We made the following rulings, which may be of interest to those planning similar projects.

Place of dwelling. Over 350 couples could not be contacted for the presurvey because they had moved out of the study area, although they had not yet changed their household registration. They were not actively recruited, but were considered eligible. We decided that if a couple left the project area after enrolling they could still remain in the plan provided one partner returned annually with a current copy of their household register. If one member of a couple moved out prior to the cutoff date for enrollment, the couple could still join as long as one member remained registered as a resident of the pilot township.

An additional unknown number of couples had moved into the area but had not registered this move as of the time that lists of eligible couples were drawn up. They were not regarded as eligible. A local eligibility committee consisting of the township mayor and the household registration officer ruled on these cases. Some registrants were merely overlooked when the first lists were made or could not register due to exceptional circumstances such as military service. These couples were enrolled if they applied. Most eligibility disputes were easily settled by reference to household registration documents.

Pregnancy. In the presurvey about 20 percent of women with three living children were found to be pregnant. Since the project did not wish to encourage late abortion, these women were not actively recruited. If they came in for enrollment, however, they were accepted, provided they were no longer pregnant and had not had a live birth in the interval.

Multiple births. Each member of a set of twins born prior to enrollment counts as one child. After enrollment each set of twins counts as one child if that set of twins would mean (1) that the final payment would be reduced, or (2) that the family would be dropped. (These same rules apply to other multiple births.)

Adoptions. Children adopted by the couple are not counted in this plan. Children born to a couple and given up for adoption are counted against their total.

Death of children. The number of children that each couple has is determined by the number living at the time of enrollment or at the time of the annual revisit. However, once a couple has reported a third or fourth child they may not be reinstated in the plan at the previous level of payment. In other words if a third child is born and dies prior to the annual deposit period, then payment continues at the two-child level. If, however, the child is still alive at the annual deposit period, and payments are reduced accordingly, payments cannot be reinstated later upon the death of a child. This rule should minimize any possible accusation that this plan encourages infanticide.

Death of spouse. In the event of death of spouse the surviving partner can enroll or continue the account. In case of remarriage any children born subsequent to the remarriage are added to the total for the enrolled spouse. Children born to the nonenrolled spouse prior to the remarriage are not counted.

Incapacitation. If the wife is incapacitated by mental or physical illness the husband can enroll.

Divorce. Because of disputes over child custody and problems of remarriage and subsequent childbearing, it was determined that in the event of divorce the account is forfeited. Individual cases can apply to the eligibility committee for exemption in cases of desertion or prolonged separation.

Polygamy. Children of second wives and concubines are not counted. Since the practice of keeping a second wife is diminishing this seems practical. Later, if this plan seems to be promoting the practice of polygamy, all children in each household may be counted as belonging to the first wife.

Financing

The original $40,000 Population Council grant for support of this program included $2,000 for administration and sur-

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vey, and $38,000 for deposit. Even if all 727 enrolled couples remain in the program, this deposit will be sufficient to cover enrollment fees and six full years of annual payments. Dropouts should allow this initial deposit to last even longer than anticipated, possibly for the full life of the program. With 9.5 percent interest, the amount necessary to hold one regular-plan couple for ten years is reduced from $175 to $108, if placed on deposit when the couple enrolls, rather than being deposited annually.

We decided that the checks issued to couples at maturation would be transferrable to any other person. They would not be redeemable for cash and could only be used for education payments.

Who Enrolled

Among the 961 women who were interviewed in the presurvey, 611, or 64 percent, joined the program (Table 3). Among women who had said that they wanted no more children, 79 percent joined; and 73 percent of those with 3 living sons joined. In the presurvey, all 327 women with no sons said that they wished to have one or more sons. Women with no sons and one daughter joined in 60 percent of cases, whereas those with no sons and two daughters joined in only 47 percent of cases. The lowest enrollment rate was among 25 women with no living sons but with three daughters, only 12 percent of whom joined the plan. Enrollment rates for women with no living sons, by number of daughters and by number of sons wanted were as follows:

Living daughters	*Enrollment rate (%)*
0	62
1	60 > 61
2	47
3	12 > 37
Sons wanted[a]	
1	57
2	55
3+	60

[a] Nonresponse and "up to God" omitted.

These findings tend to support the strong Chinese reliance on sons and indicate that unless a family has a boy they will be hesitant to limit births. Among 144 women who had one or more daughters but no sons, the mean number of daughters after which they stated they would stop trying for a son was 3.7.

Most important in analysis of this program will be its effect on finished family size. Among 80 women whose number of living children plus number of additional children wanted added up to two or fewer, 61 (or 76 percent) joined. Among 109 women who had three living children and who wanted no additional children, 85 (or 78 percent) joined. The final fertility of these 146 enrollees should not be materially affected by this incentive program. On the other hand, among 317 women who had zero, one, or two children and wanted three, 225 (or 71 percent) joined. Also 444 women claimed to want four or more children, but 237 (or 53 percent) enrolled anyway. If these 462 women (225 plus 237) actually have fewer children than they claimed to want, a portion of this reduction will be due to the program. If any real change in attitude has taken place, the stated additional children wanted among these women should decline appreciably within a short time. A follow-up survey to detect these changes could take place 12 to 24 months after enrollment. The final measure of this program will be not only how much total fertility is reduced, but how much change takes place in the fertility behavior of this group, representing 76 percent of enrollees, who expected more children than the program allows. This should be detectable within 48 to 60 months after enrollment.

Enrollment rates by a number of other categories were computed as follows:

Category	*Enrollment rate (%)*
Living in nuclear family unit (N = 310)	67
Currently use contraception (N = 127)	82
Household income over US$100/month (N = 98)	74
Household income less than US$25/month (N = 69)	70
Wife aged 25 or above (N = 463)	67
Own a television set (N = 438)	66
Head of household works as manual laborer (except farming) (N = 179)	57

TABLE 3. *Enrollment Rates Among All Respondents (N = 961) by Various Categories*

(*figures in percents*)

Category	All children						Sons			
	0	1	2	3	4	5+	0	1	2	3
Number living	62	66	63	62			55	66	74	73
Ideal number		74		72	56	49		76	64	62[a]
Additional number wanted	79	67	59	59[a]			73	65	55[b]	

Note: Nonresponse and "up to God" omitted.
[a] Three or more. [b] Two or more.

Preliminary analysis of enrollees without controls indicates that most socioeconomic variables were not significant predictors of acceptance, including: number of living children, number of modern objects owned, importance of saving money, desire to live with children in old age, expectation that children will finish college or high school, and education of husband or wife. The best predictors of enrollment were: currently use contraception, want no more children, ideal family size has been achieved, ideal number of children is less than three, ideal number of sons is one, living sons number two or three, and living children plus additional children wanted equal three or less. The best predictors of nonenrollment were primarily those concerning preference for sons and preference for large families including: have three daughters, have no sons, want four or more children, want additional children or additional sons, and husband works as a laborer.

Evaluation

Registration events in the individual villages in the township are being planned for 1972. These events will include entertainment, speeches, and awards to the villages with high enrollment and continuation rates. Reregistration will take place at this time with allowance made for late registration of women or couples unable to attend the events. These public gatherings should increase social support for the program and make cheating more difficult.

We will administer short questionnaires annually at reregistration to determine the extent of contraceptive practice and any changes in fertility aspirations. We intend to use for control purposes a panel of women selected by matching from a KAP survey now in the field. Subsequent surveys in Hua Tan will be

timed to coincide with KAP surveys. Standardized questionnaires used in Taiwan will facilitate comparison and analysis. By September 1973 we should be able to measure the effect of this program on family size ideals, number of additional children wanted, and practice of contraception. By September 1975 we should be able to begin to measure the program effect on fertility.

NATIONWIDE SCHEME—OPERATION

Education in Taiwan is free of charge through junior high school (nine years). The education budget now consumes 32 percent of provincial tax revenues and 53 percent of local taxes (*12*). If significant fertility reduction occurs, these funds can be used to provide for increased higher education rather than continued classroom expansion, staffing, and maintenance for the lower grades. If significant changes in attitude and a measurable reduction in fertility result from our program, it will be offered to the provincial and national governments for possible adoption. It might operate as follows:

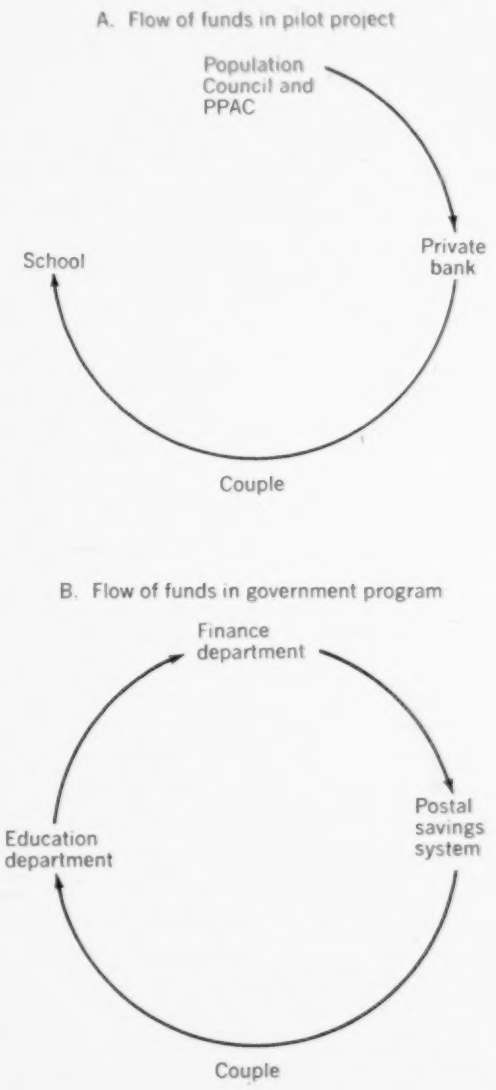
The finance ministry could initiate the program by establishing an educational trust fund within the existing postal savings system. If regulations permit, this trust fund should accumulate interest. The first couples recruited might be indigents from economically depressed areas. When a couple joined the plan, an amount equal to their initial deposit would be transferred to the trust fund. If they subsequently withdrew, their forfeited money could be used to pay enrollment deposits for additional couples.

Government policy could determine how the postal savings program would use these funds, for instance in making development loans and in financing semigovernment projects. After six or seven years of program operation the government would begin to obtain returns in the form of decreasing primary and junior high school enrollments. This should allow them to accelerate the tempo of recruitment and to extend the program to new locations and to additional families in operating areas. In a highly effective program the result would be equivalent to offering universal free high-school education since almost all families would be limiting their size to two or three children, and would be sending these children on to high school or college.

Since payment would be in the form of transferrable but nonredeemable tuition payment checks, the funds would flow from the postal savings system's educational trust fund directly to individual schools, with the enrolled couples as the medium of transmittal. No funds would leave the government system. A comparison of the flow of funds in the pilot project and in the proposed system is presented in Figure 2.

A very rough cost analysis using present education costs and estimating that each enrolled and retained couple would prevent one birth yields a ratio of savings to investment, in education costs alone, in the neighborhood of seven to one. This investment, however, would be held in the postal savings program, so the transfer of funds would be entirely intragovernmental. As the pilot program evolves, and the effect on fertility is analyzed, a more sophisticated cost-benefit analysis of this program will be made. The additional social and economic benefits of reduced fertility and increased educational level will also be considered in future analysis.

FIGURE 2. *Comparison of Funding in Pilot Project and Government Program.*



CLOSING COMMENTS

Unresolved Problems*

In order to offer in advance a few qualifications to the generally optimistic presentation of this project, the following list of unresolved questions is presented:

Did couples join the plan simply as an "insurance" measure with no intention to change their fertility behavior?

Do husbands and in-laws approve of and support this plan, and is their support vital to success?

Does the support of community leaders necessarily denote strong general community approval of this program; and is this approval necessary for success?

Is the amount of money provided sufficient to keep families in the program; and is it equitable in terms of education payments?

How can this program focus on social welfare, rather than simply birth prevention?

What steps can be taken to insure that this project will be considered for extension at local expense, if it is successful?

When can plans be made for full-term financing of the pilot project; and when can more specific cost/benefit analysis be performed?

What exactly are the implications of any fertility reduction that may occur in the study area; and what are the special problems caused by preference for sons?

Will some families have children who will be ready for high school before the account matures; and did this discourage recruitment of those with older children?

How will we analyze reasons why couples did not join the program and why enrolled couples do not continue?

Are annual public meetings actually the best means of insuring continuation?

Should a similar township be selected as a secondary control, in addition to the matched cases from the KAP study population?

How can behavioral science inputs be maximized to include local psychologists, rural sociologists, social anthropologists, agricultural economists, and others?

Answers to these questions can, in some cases, be sought through surveys of enrolled couples and of those who failed to join, studies of those who were not eligible, use of selected villagers or villages as sources of information, reli-

* The authors are indebted to Mr. George Cernada for having played the role of "Devil's Advocate" in preparation of this section.

ance on the established channel of community leaders, and other direct and indirect measures. Throughout, all research activities in the study area must be carefully undertaken so as not to bias the study through undue investigation or unreproduceable inputs.

It must be admitted that there is a possibility that this trial incentive program will fail to produce a strong and measurable fertility decline. If so, it will be as important to know the reasons for failure as it would be to know the reasons for success. Most important, failure of this project in Taiwan should not discourage programs from being tested elsewhere. The basic concept of transfer payments as rewards for reduced fertility remains sound, and deserves testing in a variety of forms in other countries. Thus, in conclusion, we offer guidelines for creating and testing similar programs.

Preliminary Guidelines*

A well-established conventional contraceptive delivery system can serve as a base for testing an incentive program that extends beyond family planning.

Choose an area that has delivery systems for family planning services.

Structure the project so that if it proves to be effective, it can be adopted and financed with local money in the long term.

Include competent local researchers and personnel from the pilot area in all steps in planning.

Use the program to foster the social welfare and economic advance of those portions of society which are both poorest and most fertile.

Use an incentive that accords with local values, delivered through a trusted channel within a reasonable period of time.

Build in functional controls against fraud, but do not let the possibility of cheating stop the project.

Keep government officials and economic planners informed of the project, but do not expect to gain unanimous agreement before starting.

Work on extending privileges to small families rather than curtailing the established "rights" of large families; this will keep the focus on positive rewards rather than negative sanctions.

Remain flexible in the implementation period and be prepared to make new rules as additional categories of eligible couples are identified.

* The first four of these guidelines are based on the report of a working conference on incentives held at Chapel Hill, North Carolina on 24 and 25 June 1971. The last five are based on the authors' experience.

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Singapore: A Cost-Effect Analysis of a Family Planning Program

by WAN FOOK KEE *and* QUAH SIAM TEE

This paper presents an analysis of cost by method in the Singapore National Family Planning Program from July 1967 to December 1970 and demonstrates one way cost data can be used in measuring cost-effectiveness. The paper was prepared by Dr. Wan Fook Kee, M.B.B.S., M.Sc., M.P.H. and Mr. Quah Siam Tee, B.Sc. (Hon.), M.Sc. Dr. Wan is Senior Health Officer of the Ministry of Health and Secretary of the Family Planning and Population Board, Singapore. Mr. Quah is a statistician in the Public Health Division of the Ministry of Health.

The Singapore Family Planning and Population Board was inaugurated in January 1966 to implement a national family planning program. The board received an annual subsidy of S$200,000 from the government from 1966 to 1970. In addition, during the five-year period, the board received a grant of US$90,000 (S$270,000) from the Ford Foundation and a sum of S$50,000 from the International Planned Parenthood Federation for the establishment of a cytology unit. Furthermore, the board received considerable support in staff time from the government ministry of health staff. A review of the progress and achievement of the Singapore National Family Planning Program has been published (Wan, 1970). During the five-year period, 1966 to 1970, a total of 156,556 family planning acceptors utilized the services provided by the board. A cost-effect analysis of the program seems worthwhile.

Method

The board's evaluation unit was set up in 1967—about a year and a half after program activities began. Data for this cost-effect analysis relate to the period July 1967 to December 1970. A 10-percent systematic sample from all acceptors recruited during the period July 1967 to December 1967, continuing and discontinued, was selected and studied. For this study when an acceptor bought contraceptives for a period of time it was assumed that she was "protected" for that entire period.

Total Cost

The cost is determined for all services and materials required to provide one family planning consultation hour. Only recurrent cost is considered. Capital costs and depreciation are not included in this exercise. The method used here is similar to that developed for use in national health planning by the Center for Economic Studies (CENDES) in Venezuela. In this method, all personnel and other resources can be expressed in monetary terms in what is called the "instrument." (In this case, the instrument is the family planning consultation hour, or all the resources required to provide one hour of family planning consultation.)

Briefly, our procedure was as follows: an inventory of the resources of the board was taken. Staff time contributed by the Ministry of Health personnel was included among the indirect resources of the board. Data relating to the resources for 1970 are in appendix 1. The resources in monetary terms divided by the total number of family planning consultation hours gives the cost of the different categories of resources per family planning consultation hour (shown in appendix 2). The total average cost of one family planning consultation hour is thus S$28.04.

Cost by Method

To determine the cost by contraceptive method (Table 1), it is necessary to determine: (1) the average number of visits made by one acceptor for each of the various contraceptive methods during the period July 1967 to December 1970; and (2) the average consultation time required to service one acceptor for each of the contraceptive methods. To determine the former, a random sample of 7,917 clinic cards was studied. To determine the latter, a random sample of 1,065 patients was actually observed. We found that on the average a patient requires 3.7 minutes of service from the nursing staff for one visit and for those patients who also require the services of a family planning physician, an additional five minutes of physician time is required. (As a rule, the initial visit required consultation with a physician and subsequent visits did not.) From these findings the consultation time (excluding waiting time for the patient) and the cost required for servicing one acceptor from July 1967 to December 1970 are computed for each contraceptive method.

Example: Consultation time to service one oral contraceptive acceptor = (1 × 11.2 minutes) + (10 × 6.2 minutes) = 73.2 minutes. Cost = 73.2 minutes × S$28.04/60 = S$34.7.

The consultation time and cost computed by contraceptive method are as follows:

Method	*Time (minutes)*	*Cost (S$)*
Oral	73.2	34.2
Condom	26.4	12.3
IUD	62.9	29.4
Other	45.0	21.0
All	58.9	27.5

Waiting Time

It is possible to contrast two kinds of costs in family planning programs: costs to the program and costs to the user. User costs would include waiting time,

TABLE 1. *Number and Duration of Visits by Type of Visit and by Method, July 1967 to December 1970*

	Average number of visits[a]	Probable error[b]	Consultation time for first visit	Probable error[b]	Consultation time for revisit	Probable error[b]
Oral	11.0	0.09	11.2	0.94	6.2	0.12
Condom	3.8	0.06	11.6	1.29	5.3	0.25
IUD	4.7	0.12	20.0	3.75	11.6	0.73
Other	5.0	0.16	9.0	0.81	9.0	0.84
All methods	8.5	0.07	11.7	0.65	6.3	0.11

[a] The average number of visits is the estimated average number of visits per patient (including discontinuers) during the period July 1967 to December 1970.
[b] Error of estimate at 0.5 level.

travel time, out-of-pocket expenses involved in travel, baby-sitting time, cost of contraceptives, cost of pregnancies resulting from contraceptive failure, and so on. In this paper, only the waiting time will be considered.

To determine the average waiting time of each acceptor, a sample eight-week period was selected for study. During this period, 20,329 patients were seen by family planning physicians in 2,800 hours of family planning consultation. During the same period, 67,696 patients were seen by family planning nursing staff in 6,240 hours of family planning consultation. The single-channel queuing theory (Stoller, 1969) is used to estimate the waiting times separately for patients seen by the physicians and those seen by the nursing staff. The theory involves the following two assumptions:

1. The probability distribution of patients' arrival time and clinic staff servicing time are both negative exponential.

2. If W_1 is the waiting time to obtain the nurse's service and W_2 is the additional waiting time to see the physician, then W_1 and W_2 are statistically independent. Thus, the total waiting time when a patient requires the service of the physician is $W_1 + W_2 (= W)$.

ESTIMATION OF W_1

Patient's arrival rate: $\lambda = 67{,}696/6{,}240 = 10$ patients per hour

Servicing rate: $\mu = 60/3.7 = 16.2$ patients per hour

Servicing factor: $\rho = \lambda/\mu = 0.6728$

Average congestion: $T\rho/(1 - \rho) = 2.1$

$\therefore W_1 = T = 2.1/16.2 = 7.8$ minutes

ESTIMATION OF W_2

$\lambda = 20{,}329/2{,}800 = 7.3$ patients per hour

$\mu = 60/5 = 12$ patients per hour

$\rho = \lambda/\mu = 0.6083$

$T = \rho/1\text{-}\rho = 1.6$

$W_2 = (1.6/12) \times 60 = 8$ minutes

$\therefore W = 7.8 + 8 = 15.8$ minutes

Assuming that all first visits call for attention from a physician:

Waiting time for first visit = 15.8 minutes

Waiting time for a revisit (weighted mean) = 15.8 × fraction of revisits receiving physician's attention + 7.8 × fraction not receiving physicians' attention = 10.1 minutes.

The total consultation time in minutes, by type of visit and by method is as follows:

Method	*First visit*	*Revisit*
Oral	27.0	16.3
Condom	27.4	15.4
IUD	35.8	21.7
Other	24.8	19.1
All	27.5	16.4

By incorporating the estimated waiting time for first and revisits, we obtain the following total waiting time by type of visit and method for an acceptor during July 1967 to December 1970:

Method	*Time (minutes)*
Oral	190.00
Condom	70.50
IUD	116.10
Other	101.20
All	150.20

Effect

The effect of family planning is taken as the number of births prevented. Various methods of estimating births prevented have been developed. The rough measure used here illustrates how some measure of effectiveness can be combined with cost data to examine cost-effectiveness by method. To determine this effect we have to determine the theoretical number of births that would occur in 100 woman-years if no contraceptives were used. The largest number of births in the history of the Republic of Singapore was 62,495 in 1958. This figure can be considered to approximate the theoretical figure. In 1958 there were 201,786 married women aged 15 to 44 years. Thus, in Singapore if no contraceptives were used, a figure close to 30.97 births would occur in 100 woman-years (62,495/201,786 × 100). The maximum number of births prevented if the contraceptives are 100 percent effective is 30.97 per 100 woman-years. The effectiveness of the various contraceptives is assumed to be as follows:

Method	*Effectiveness (percent)*
Oral	100
Condom	85
IUD	98
Other	75

The numbers of woman-years of use of the various contraceptive methods from July 1967 to December 1970 were estimated. For oral contraceptives, the cumulative continuation rates from the oral contraceptive continuation rate study (Wan, 1971) are used as follows. On the average, the number of cycles covered by oral contraceptives for an acceptor who started "i" months ago is C_i. (The cumulative continuation rate table is in appendix 3). If N_i is the number of oral contraceptive acceptors recruited "i" months before the cutoff date of this cost-effectiveness study, 31 December 1970, then the period of protection in woman-years is

$\Sigma N_i C_i/12 = 703{,}137/12 = 58{,}595$ woman-years.

Assuming that the oral contraceptive is 100 percent effective, the number of births prevented in 100 woman-years of use is 30.97. Thus, the total number of births prevented by oral contraceptives from July 1967 to December 1970 is 18,147.

For the other contraceptive methods, samples have been used to estimate the number of woman-months of use (Table 2).

The total number of births prevented by the various contraceptive methods are then calculated (Table 3).

TABLE 2. *Use by Method (Samples), July 1967 to December 1970*

Method	Use (woman-months)	Sample size	Actual acceptors
Condom	25,087	2,030	39,265
IUD	8,724	407	5,800
Other	5,797	373	5,994

TABLE 3. *Births Prevented by Method July 1967 to December 1970*

Method	Use (woman-years)	Effectiveness	Number of births prevented
Oral	58,595	100	18,147
Condom	40,435	85	10,644
IUD	10,360	98	3,144
Other	7,763	75	1,803
Total	—	—	33,738

Cost Effectiveness

The cost to prevent one birth by the various contraceptive methods is calculated as shown by the following example. During the period July 1967 to December 1970, a total of 60,301 oral contraceptive acceptors were recruited. Since the number of births prevented by oral contraceptives during this period is 18,417, an average of 3.32 oral contraceptive acceptors was required to prevent one birth. Thus, the cost to prevent one birth when oral contraceptives were used = 3.32 × S$34.2 = S$114. i.e., the estimated number of acceptors needed to avert one birth times the relevant estimated program cost. Similarly, the costs per birth prevented by the other methods are calculated (Table 4).

TABLE 4. *Cost Per Birth Prevented by Method*

Method	Number of acceptors to prevent one birth	Cost per birth prevented (S$)	Rank
Oral	3.32	114	4
Condom	3.69	45	1
IUD	1.84	54	2
Other	3.32	70	3
All methods	3.30	91	—

Discussion

This study illustrates one method of computing cost-effectiveness by contraceptive method. However, the comparative costs to prevent one birth by the various contraceptives constitute only one of the criteria for contraceptive selection in a family planning program. Personal likes and dislikes, emotional factors, and medical side-effects must be taken into consideration. The high cost of using the oral is balanced by its almost 100 percent effectiveness. On the other hand, the relatively low cost of birth prevention for condoms (S$45) may be an artifact of the 85-percent effectiveness rate used in calculation of births prevented. If lower use-effectiveness were assumed for condoms, the cost-effectiveness for this method might well be much closer to that for orals.

In Singapore, contraceptive failure is an indication for legalized abortion. If the cost involved in performing one legalized abortion is computed, this can be used to compute the comparative costs of a 100-percent-effective family planning program using the various contraceptives where pregnancies resulting from contraceptive failures could be terminated legally. This could be a subject for further study.

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APPENDIX 1. *Resources of the Singapore Family Planning and Population Board (F.P.P.B.), 1970*

Classification of resources	Direct resources (F.P.P.B.) Number	Working hours per week	Total cost per annum (S$)	Indirect resources (Ministry of Health) Number	Working hours per week	Total cost per annum (S$)
Total: (all items)	115	4,830	825,600	284	2,324	306,365
Total: (direct and indirect resources)	399	7,154	1,131,965			
Personnel						
Chairman				1	17	13,200
Secretary				1	18	11,520
Family planning doctors	7	294	79,200	24	266	42,300
Statistician				1	28	8,760
Evaluation personnel	7.5	315	17,000			
Photographers	2	84	4,000			
Cytologist				1	35	12,960
Cytology personnel	6.5	273	17,000			
Administrative and finance officer	1	42	8,720			
Administrative personnel	7	294	23,385			
Office boys	2	84	2,900			
Health training and education				3	55	18,000
Maternal and child health office				1	51	23,760
Family planning clinic workers	42	1,764	146,000			
Maternal and child health services—sister, nurses, and midwives				252	1,854[b]	175,865
Other personnel	40	1,680	53,795			
Total personnel	115	4,830	352,000	284	2,324	306,365
Contraceptive supplies[a]			285,000			
Consumption[a]			188,600			

[a] For a breakdown of these direct resources, see appendix 1a.
[b] Comprises 238, 831, 785 hours from 33 sisters, 113 nurses and 106 midwives respectively.

APPENDIX 1a. *Additional Direct Resources of the Board, 1970*

Classification of resources	Total cost per annum (S$)
Contraceptive supplies	
Oral	200,000
Condom	60,000
IUD	—
Other	25,000
Total contraceptive supplies	285,000
Consumption	
Evaluation service expenses	20,000
Cytology service expenses	6,000
Equipment and safes	20,000
Stationery	8,000
Utilities—postage and telegram, electricity and water	6,000
Maintenance of equipment	600
Other medical and surgical supplies	49,000
All other residual expenses	79,000
Total consumption	188,600

APPENDIX 2. *Resources of the Family Planning Consultation Hour, 1970*

Classification of resources	Direct resources		Indirect resources (Ministry of Health)	
	Time unit (hour)	Monetary unit (S$)	Time unit (hour)	Monetary unit (S$)
Personnel				
Chairman			0.0218	0.3254
Secretary			0.0231	0.2840
Family planning doctors	0.3769	1.9525	0.3410	1.0428
Statistician			0.0359	0.2159
Evaluation personnel	0.4038	0.4191		
Photographers	0.1077	0.0986		
Cytologist			0.0449	0.3195
Cytology personnel	0.3500	0.4191		
Administrative and finance officer	0.0538	0.2149		
Administrative personnel	0.3769	0.5765		
Office boys	0.1077	0.0714		
Health training and education			0.0705	0.4437
Maternal and child health office			0.0654	0.5857
Family planning clinic workers	2.2615	3.5994		
Maternal and child health services—sister, nurses, and midwives			2.3768	4.3357
Other personnel	2.1538	1.3263		
Total personnel	6.1921	8.6778	2.9794	7.5527
Contraceptive supplies				
Oral		4.9307		
Condom		1.4792		
IUD		—		
Other		0.6163		
Total contraceptive supplies		7.0262		
Consumption				
Evaluation services expenses		0.4930		
Cytology services expenses		0.1479		
Equipment and safes		0.4930		
Stationery		0.1972		
Utilities: postage and telegram, electricity and water		0.1479		
Maintenance of equipment		0.1480		
Other medical and surgical services		1.2081		
All other residual expenses		1.9478		
Total consumption		4.7829		
Total: personnel, contraceptive supplies, and consumption (direct and indirect resources)	9.1715	28.0396		

APPENDIX 3. *Cumulative Continuation Rates*

Cycle (i)	Continuation rate (per acceptor)	Cumulative continuation rate (C_i)
1	0.793	0.793
2	0.735	1.528
3	0.689	2.217
4	0.664	2.881
5	0.642	3.523
6	0.598	4.121
7	0.581	4.702
8	0.562	5.264
9	0.547	5.811
10	0.530	6.341
11	0.517	6.858
12	0.500	7.358
13	0.485	7.843
14	0.471	8.314
15	0.459	8.773
16	0.448	9.221
17	0.446	9.667
18	0.446	10.113
19	0.415	10.528
20	0.410	10.938
21	0.399	11.337
22	0.392	11.729
23	0.384	12.112
24	0.372	12.485
25	0.364	12.849
26	0.355	13.204
27	0.352	13.556
28	0.346	13.902
29	0.343	14.245
30	0.332	14.577
31	0.326	14.903
32	0.326	15.229
33	0.300	15.529
34	0.289	15.518
35	0.281	15.799
36	0.274	16.073
37	0.267	16.340
38	0.260	16.600
39	0.253	16.853
40	0.246	17.099
41	0.240	17.339
42	0.233	17.572

Note: In the 30-month oral contraceptive continuation rate study, continuation rates (y) were available only for the first 32 cycles. Continuation rates from cycle 33 on were projected from the trend curve:

$$y = 0.7159 \times 1.027^{-x}$$

IUDs and the Birth Rate in Greenland

by Ole Berg

This article describes the results of an IUD program in Narssaq District in South Greenland. Dr. Berg served as health officer of the district for five years, before which time he and his wife, also an M.D., both worked for one year as doctors at the all-Greenland Hospital in Godthaab, the capital of Greenland. They attribute the success of the IUD program in their district in part to their knowledge of the Greenlandic language and people and to the communication and education campaigns they launched. Dr. Berg is currently with the Institute of Hygiene of the Faculty of Medicine at the University of Copenhagen.

In autumn 1967 an IUD program was initiated in 17 medical districts in Greenland. An effective contraceptive program was greatly needed because at that time Greenland had one of the world's highest birth rates, the incidence of venereal disease was high, and the only contraceptives available, the condom and pessary, were seldom used and ineffective.

In the district of Narssaq, the IUD program had the following results:

In 1969, after only two years of program operation, 33 percent of the Greenlandic women of reproductive age had accepted IUDs.

The number of births in the town of Narssaq fell from 85 in 1967 to 45 in 1968, 34 in 1969, and approximately 25 in 1970.

In 1969 the district had a population of about 1,750 and a birth rate of 20 per thousand.

Background

Greenland, which previously had the status of a colony, since 1953 has been an integral part of the Kingdom of Denmark. Her population shares equal political rights with all other Danish nationals. However, unlike the rest of Denmark, Greenland has many characteristics of a developing country, both in demographic conditions and the overall stage of development of the island.

In recent decades Greenland has experienced a rapid increase in population, far in excess of that of the rest of Denmark. Currently the growth rate in Greenland is higher than in any other country in the world. An important factor in the rise in growth rate in recent years has been the decrease in mortality rates—from about 24 per thousand before 1950 to about 10 per thousand since 1960—which has occurred largely because of the very effective prevention of tuberculosis during the last decades. A second factor in the growth rate has been the distinct rise in the previously high birth rate—from about 40 per thousand in 1950 to about 50 per thousand in 1960—since then, although the rate has shown a downward tendency, it has remained very high—46 per thousand in 1964.

According to the general population count on 31 December 1965 the total population was 39,599 persons, of whom 35,118 were born in Greenland. Largely as a result of the high birth rate, the age distribution in Greenland presents the distinct pattern of a developing country: 50 percent of the Greenlandic population is under 16 years of age.

At the time of the population count, about one-third of all births were illegitimate, and infant deaths constituted 28 percent of all deaths. Furthermore, there was (and continues to be) a high level of sexual activity, especially among young people, as evidenced by an analysis of unmarried Greenlanders' sexual habits, which Dr. Gunnar Lomholt and I conducted in the summer of 1964, in connection with a venerological investigation in South Greenland.* Clearly, the incidence of practice of contraception in Greenland up to that date was very low, and the effect of such practice on the size of the population was negligible. There was an urgent need for effective contraception.

The only contraceptives available in Greenland were the pessary and the condom. For a number of years condoms have been available in the local shops, and since the mid-1960s they have been carried in slot machines placed at central locations, such as the assembly buildings. Nonetheless, the condoms do not seem to have been popular. During 1965 approximately 1,300 condoms were sold in Narssaq which had a total population of 1,500 at that time.

Despite efforts to make pessaries and spermicidal creams readily available to all women, particularly those with many children, these methods have not been popular either. This may be because the Greenlandic housing situation makes it difficult for the women to use the pessary. Very few houses have a separate bathroom, and any kind of personal hygiene must take place in the kitchen, which opens onto the living room. Furthermore, many houses are overcrowded—especially those with large families where contraception is urgently needed. I made a sociomedical housing investigation in Narssaq in the summers of 1969 and 1970 and found that 70 percent of the houses containing families with children under 16 years living at home have two or more persons per room, 22 percent three or more, and 7 percent four or more.

In 1966 Dr. Erik Rosen, chief physician at the Mother Help Institution in Copenhagen, after having consulted the Ministry for Greenland and the Public Health Board, traveled to Greenland. In the three largest towns, Egedesminde, Godthaab, and Julianehaab, Dr. Rosen conducted an investigation on the possibilities of using the Lippes Loop in Greenland. As a consequence of this study, we started an IUD campaign. The IUD was considered more suitable than the oral contraceptive because the latter must be taken at regular daily intervals and the Greenlanders do not adhere to such a regular day-night schedule in the summer when there is no night in the North and only a short night in the South. Furthermore, their summer activity of living for two to three months in a tent on the fishing grounds does not facilitate pill taking.

The IUD Program

In the autumn of 1966, in the three towns in which Dr. Rosen had conducted his study, 300 women voluntarily had the Lippes Loop inserted and during the fol-

* The investigation is published (with an English summary) in two articles "Gonorrhoea in South Greenland" and "Venerological investigation in Nanortalik District" in the *Ugeskrift for Laeger* 127, no. 14 (April 1965):8 as well as in an article "Gonorrhoea situation in South Greenland in the *British Journal of Venereal Diseases* 42, no. 1 (March 1966).

lowing year were followed up for complications. When this initial program proved successful, health officers of the 17 Greenlandic medical districts attended a course in 1967 on inserting the IUD. The program was introduced in the 17 districts in the autumn of 1967.

I shall report here how we initiated and developed the program in Narssaq medical district. Narssaq, with about 5 percent of the island's total population, is one of the smaller medical districts. In 1967 the total population in the district numbered 1,925. Of the total, 1,725 persons lived in the town of Narssaq and the remaining 200 in outlying areas of the district. Narssaq has a fairly developed industry based on processing of fish and an export slaughter house for sheep and lamb that serves all of South Greenland.

Campaign in Narssaq

From the beginning we carried out an intensive program of public information and education: at intervals informative articles were published in the local newspaper; posters were hung up in the waiting-room of the hospital; publications in two languages were distributed at all consultations for pregnancy and venereal disease, and lectures were given in the assembly house.

The campaign was received with great interest by the population, and after a couple of months a number of women had had IUD insertions. The frequency of complications was remarkably low, even among women without children. (But, of course, the process was not so simple that we could send an IUD to a woman living in a lonely sheep-keeping place, for the sum of 5 crowns enclosed in her letter, because she "wanted to pause between the childbirths.")

TABLE 1. *Number of IUDs Inserted, by Month, Narssaq District: November 1967–July 1969*

Month	1967	1968	1969
Jan.		16	16
Feb.		7	6
Mar.		11	2
Apr.		9	7
May		10	3
June		8	2
July		6	1
Aug.		9	
Sept.		4	
Oct.		0	
Nov.	16	3	
Dec.	17	5	
Total/year	33	88	37
Total			158[a]

[a] Includes 6 reinsertions

At the end of one year, when I left my position in Narssaq and went back to Denmark, we had inserted 113 IUDs. In the summer of 1969, when I returned to Narssaq to conduct the sociomedical housing investigation, records indicated that since my departure another 45 IUDs had been inserted, for a total of 158 insertions in the district between November 1967 and July 1969. Of this total six were reinsertions (see Table 1).

WHO ACCEPTED

Of the 152 acceptors, 136 were Greenlanders and 16 Danes, three of whom were married to Greenlanders, 10 to Danes, and three unmarried. Only seven of the 152 women had discontinued after having used the IUD for an average of six months. Of the discontinuers, five were Greenlanders and two Danes. Five of the six reinsertions were for women who had lost their IUDs, and the other was for a woman who needed a smaller size. All six women were Greenlanders.

In 1967, in the total population of the Narssaq medical district (1,925 persons), there were 981 men and 944 women. Of the 944 women, 825 were Greenlanders and 119 Danes. Since 374 of the Greenlandic women were under 15 years, there were 451 adult women in the whole district. If we suppose only 43 of these women were beyond the fertile age, then in 1969, after less than two years of program operation, 33 percent of the Greenlandic women in the Narssaq district in the fertile age groups had accepted the IUD (136 Greenlandic women out of a calculated total of 408). The number of women at risk of pregnancy is undoubtedly smaller, and the percentage consequently proportionally greater.

The distribution of the population in the Narssaq medical district by place of birth, sex, and marital status, as of 31 December 1967 is shown in Table 2. The distribution of IUD acceptors by place of birth and marital status cross-categorized by number of previous deliveries appears in Table 3. Table 4 shows the distribution of acceptors by age cross-categorized by number of previous deliveries.

TABLE 2. *Distribution of Population by Sex, Place of Birth, and Marital Status, Narssaq: 31 December 1967*

Sex and place of birth	Married	Widowed	Separated/ divorced	Single		Total
				Over 15	Under 15	
Male	271	14	14	295	387	981
Greenland	183	12	5	193	357	750
Other	88	2	9	102	30	231
Female	260	55	18	197	414	944
Greenland	207	54	11	179	374	825
Other	53	1	7	18	40	119
Total	531	69	32	492	801	1,925

TABLE 3. *Characteristics of Acceptors, Narssaq: 1969*

Number of deliveries	Greenland	Denmark	Total	Married	Widowed, separated, divorced	Single	Status unknown	Total
0	24	2	26	0	0	24	2	26
1	24	1	25	4	1	19	1	25
2	19	8	27	14	0	11	2	27
3	14	2	16	8	1	5	2	16
4	15	2	17	9	1	6	1	17
5	14	0	14	11	0	2	1	14
6	9	0	9	8	1	0	0	9
7	2	0	2	2	0	0	0	2
8	3	0	3	2	1	0	0	3
9	1	0	1	1	0	0	0	1
Unknown	11	1	12	2	0	6	4	12
Total	136	16	152	61	5	73	13	152

Effect of IUD

In 1966 the town of Narssaq had 1,500

inhabitants, and in 1969, approximately 1,750. This increase in population can be attributed to migration from the villages to the industrial center.

The birth rate has shown a marked decrease. The total numbers of births for Narssaq for 1966 and 1967—prior to the start of the campaign—were 82 and 85 births, respectively. As indicated earlier, in 1968 the number of births was 45; in 1969, 34, and in 1970 it can be estimated at approximately 25, as 19 children were born by July, and in August the midwife could predict five or six births during the rest of 1970 on basis of her pregnancy notes. (It is quite understandable that the midwife in her spare time—and she has a lot more now—has started taxidriving in her small private car. She does get a fixed salary, however, from the Health Service.)

In greater Greenland the program has also met with success, although on not quite as dramatic a level as in Narssaq. In November 1969, two years after the campaign's start, 2,600 women in Greenland had had IUD insertions, or between 25 and 30 percent of all women of reproductive age. During this period the birth rate for all Greenland decreased from about 40 to 30 per thousand. Assuming that the population of Narssaq is 5 percent of that of all Greenland, and that the pattern of acceptance in Narssaq reflects that in all of Greenland, a little more than 3,000 women in Greenland should have accepted IUDs, that is, 20 times 152. Thus the number of IUD acceptors reported for all of Greenland is more than 400 short of the figure predicted on the basis of the number in Narssaq—even though the Narssaq figure is based on one year and nine months rather than the two full years used in the estimate for all of Greenland. It is obvious that in Narssaq there has been a greater level of acceptance than in all Greenland on the average. The result of the campaign in Narssaq has also been considerable, since the district had a birth rate of 20 per thousand in 1969—10 less than that estimated for all of Greenland.

The greater success in Narssaq can be attributed to the information and education program carried out in this district both by a public relations campaign and by direct and personal communication with the women in the area.

At any rate one conclusion is certain: if effective results are to be obtained by a contraceptive campaign in Greenland, the IUD has proved to be a suitable method.

TABLE 4. *Distribution of IUD Acceptors by Age and Number of Deliveries, Narssaq: 1969*

	Number of deliveries											
Age	0	1	2	3	4	5	6	7	8	9	Unknown	Total
15–19	16	8	0	0	0	0	0	0	0	0	0	24
20–24	6	12	9	3	4	0	0	0	0	0	1	35
25–29	3	2	13	6	7	8	1	0	0	0	2	42
30–34	0	1	3	4	2	2	5	0	0	0	0	17
35–39	0	2	1	2	2	1	2	2	1	0	1	14
40–44	0	0	1	1	2	1	0	0	2	1	0	8
Unknown	1	0	0	0	0	2	1	0	0	0	8	12
Total	26	25	27	16	17	14	9	2	3	1	12	152

THE POPULATION COUNCIL

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